Designation: D7055 – 14

Standard Practice for Preparation (by Abrasive Blast Cleaning) of Hot-Rolled Carbon Steel Panels for Testing of Coatings[1]

This standard is issued under the fixed designation D7055; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice covers the procedures to be followed in the preparation (by abrasive blast cleaning) of hot rolled steel panels for laboratory testing of coatings.

1.2 This standard practice does not include procedures for the application of coatings.

1.3 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

A36/A36M Specification for Carbon Structural Steel

A572/A572M Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel

A1011/A1011M Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength

D4285 Test Method for Indicating Oil or Water in Compressed Air

D4417 Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel

D4940 Test Method for Conductimetric Analysis of Water Soluble Ionic Contamination of Blasting Abrasives

D7393 Practice for Indicating Oil in Abrasives

2.2 *ISO Standard:*

ISO 8502-3, Part 3 Assessment of Dust on Steel Surfaces Prepared for Painting (pressure-sensitive tape method)[3]

2.3 *SSPC/NACE Standards:*[4]

AB-1 Mineral and Slag Abrasives

AB-2 Specification for Cleanliness of Recycled Ferrous Metallic Abrasives

AB-3 Newly Manufactured or Re-Manufactured Steel Abrasives

SP 1 Solvent Cleaning

SP 5/NACE No. 1 White Metal Blast Cleaning

SP 6/NACE No. 3 Commercial Blast Cleaning

SP 10/NACE No. 2 Near-White Metal Blast Cleaning

SSPC-VIS 1 Guide and Reference Photographs for Steel Surfaces Prepared by Dry Abrasive Blast Cleaning

3. Summary of Practice

3.1 This practice enables the user to specify the level of preparation of hot-rolled carbon steel test panels (prepared by dry abrasive blast cleaning) for testing of coatings, including the steel composition, the degree of surface cleanliness, and the type of abrasive.

4. Significance and Use

4.1 The procedures described in this practice are designed to provide hot-rolled, carbon steel panels with uniform and reproducible abrasive blast cleaned surfaces for testing of coatings.

5. Test Panels

5.1 Prepare the test panels from unpainted hot-rolled steel plate or bar stock.

5.2 The panels shall be made to a size and thickness as agreed upon between the purchaser and seller.

[1] This practice is under the jurisdiction of ASTM Committee D01 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.46 on Industrial Protective Coatings.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

[4] Available from Society for Protective Coatings (SSPC), 40 24th St., 6th Floor, Pittsburgh, PA 15222-4656, http://www.sspc.org.

5.3 The steel composition shall be either Specifications A36/A36M, A572/A572M, A1011/A1011M or as agreed upon between the purchaser and seller.[5]

5.4 The surface condition of the steel prior to surface preparation shall be specified and shall be one of two rust grades based on SSPC-VIS 1: Grade A, intact mill scale; or Grade B, rusting mill scale. If SSPC-SP 6/NACE No. 3 is specified in 6.2, then the surface condition shall be Grade B.

5.5 Remove any burr from saw-cut or sheared edges of the test panels.

5.6 Break sharp corners and/or edges using a grinding wheel.

6. Methods of Preparation

6.1 *Degreasing*—Prior to abrasive blast cleaning degrease the panels surfaces using one of the methods listed below from SSPC-SP1.

6.1.1 *Solvent Cleaning*—Immerse the panel in a cleaning solution or rub the surface with a clean lint-free cloth wetted with an appropriate solvent. If excessive oil or grease is present, power brush the surface vigorously and re-rinse or wipe.

6.1.2 *Alkaline or Detergent Cleaning*—Aqueous alkaline cleaners are available from a number of sources as proprietary compounds or processes. Clean the panels with an alkaline solution or cleaner applied by spray or immersion. Brush or wipe in accordance with the recommendations of the cleaner manufacturer. One or more steps of rinsing with water is required after this cleaning procedure. To prevent rust formation, force dry the panel surfaces immediately after rinsing.

6.2 *Select the Degree of Abrasive Blast Cleaning*—Specify one of the following degrees of cleaning as defined below.

6.2.1 *SSPC-SP 5/NACE No. 1*—White Metal Blast Cleaning.

6.2.2 *SSPC-SP 6/NACE No. 3*—Commercial Blast Cleaning.

6.2.3 *SSPC-SP 10/NACE No. 2*—Near-White Metal Blast Cleaning.

6.2.4 *Default Degree of Cleaning*—If no degree of cleaning is specified, solvent clean the panels as described in 6.1.1, then abrasive blast clean the panels to "White Metal Blast Cleaning" as described in 6.2.1.

6.3 *Select the Surface Profile (anchor pattern) Depth*—Select a surface profile range of fine, medium or coarse as defined below, or specify an alternative range.

6.3.1 Fine: 1.0 to 2.5 mils (25-63 µm).

6.3.2 Medium: 1.5 to 3.5 mils (38-89 µm).

6.3.3 Coarse: 3.0 to 5.0 mils (75-125 µm).

6.3.4 Alternative Range: The range between the minimum and maximum shall be at least 1.0 mil (25 µm).

6.3.5 Default Surface Profile Range: If no surface profile range is specified, the range shall be Medium.

6.4 *Select the Abrasive Type*—Select the abrasive type as defined below, or specify an alternative abrasive. The abrasive size shall be determined by the surface profile range selected in 6.3. The actual size(s) used shall be reported. Mineral and slag abrasives shall meet the requirements of SSPC-AB-1; Steel abrasives shall meet the requirements of SSPC-AB-2 (if recycled) and SSPC-AB-3. Test all abrasives prior to use for oil contamination in accordance with Practice D7393 and for conductivity in accordance with Test Method D4940. The cleanliness of the abrasive used shall conform to the requirements of the SSPC Abrasive Standards.

6.4.1 Steel Grit (angular).

6.4.2 Coal Slag (angular).

6.4.3 Garnet (angular).

6.4.4 Silica Sand (angular).

6.4.5 Aluminum Oxide (angular).

6.4.6 Steel Shot (rounded).

6.4.7 Blend of approximately 60 % steel shot and 40 % steel grit.

6.4.8 Default Abrasive Type: If no abrasive type is specified, the abrasive used shall be steel grit.

6.5 Verify the cleanliness of the compressed air (absence of oil and water) used to pressurize the system and to propel the abrasive through the blast hose and nozzle in accordance with Test Method D4285.

6.6 *Abrasive Blast Cleaning Operation*—Blast clean the panels using an interior-located blast cabinet or a blast room. Maintain sufficient blast nozzle air pressure to achieve the anchor profile selected in 6.3. Measure the actual blast nozzle air pressure using a hypodermic needle pressure gage. The blast system shall be equipped with compressed air moisture and oil extractors. Air dryers or coolers can be used in lieu of moisture traps. Maintain the blast nozzle angle (to the panel surface) at approximately 75 to 80°, and position the blast nozzle 6 to 12 in. from the panel surface. Perform abrasive blast cleaning using an overlapping abrasive pattern to prevent streaking and to generate a uniform appearance. Immediately after abrasive blast cleaning is performed, remove residual surface dust by blow down or vacuuming. If blow down is selected, verify the cleanliness of the compressed air in accordance with Test Method D4285. Do not handle the test panels with unprotected hands. Handle all test panels by the edges using lint-free gloves.

6.7 *Verification of Surface Cleanliness and Surface Profile Depth:*

6.7.1 *Surface Cleanliness*—Evaluate the prepared panel surfaces for conformity to the specified degree of cleaning using photograph A SP10, A SP5, B SP6, B SP10, or B SP5 in SSPC-VIS 1 (based on the surface condition in and the level of surface cleanliness). Re-blast surfaces that do not conform to the specified degree of cleaning. Remove all visible blast cleaning abrasive and/or dust from the panel surfaces (see Note 1).

6.7.2 *Surface Profile Depth*—Evaluate the prepared panel surfaces for conformity to the specified surface profile depth using a depth micrometer (Method B) or replica tape (Method C) of Test Methods D4417. If Method C is used, acquire a

[5] A36/A36M specification steel is typically not available in thicknesses less than 3⁄16 in.

minimum of two readings on the first panel (averaged to create a single measurement) and one additional measurement set of readings on each 10th panel prepared in the same batch. If Method B is used, acquire a minimum of ten readings on the first panel (report the maximum measurement) and one additional set of readings on each 10th panel prepared in the same batch. More frequent/additional readings/measurements can be obtained, as agreed upon between the purchaser and seller. If any surface profile depth measurement is outside of the range designated in 6.3, the panel shall not be used.

NOTE 1—Upon agreement between purchaser and seller, ISO 8502-3, Part 3: Assessment of Dust on Steel Surfaces Prepared for Painting (pressure-sensitive tape method) can be employed to test prepared surfaces for the presence of dust. An acceptable Dust Rating must be established prior to testing.

7. Protection after Surface Preparation

7.1 Wrap prepared test panels in a paper impregnated with dicyclohexylammonium nitrite, or an equivalent volatile corrosion inhibitor (VCI), and then seal in plastic to prevent rusting of the prepared surfaces for panels that are not to be used immediately after preparation. Alternatively, prepared panels may be stored in an oven maintained at approximately 38°C (100°F), with or without the use of paper treated with VCI, or stored in clean solvent.

7.2 Prepared steel panels used after prolonged storage in VCI paper may have a residue of VCI that may affect the outcome of certain coating performance tests. The VCI residue can generally be removed by wiping the affected panel surface(s) several times with a clean, lint-free cloth wetted with warm distilled water. It is important to dry the panel surfaces thoroughly immediately after wiping to prevent flash rust. For critical tests, the operator can verify the presence and effect of VCI residue by testing a representative coating on both a panel wiped with water and on a panel coated without any wiping.

8. Report

8.1 The report supplied with the prepared steel panels shall include the following, as a minimum:

8.1.1 The dimensions of the test specimens, including length, width and thickness,

8.1.2 The composition of the steel (Specifications A36/A36M, A572/A572M, A1011/A1011M or other),

8.1.3 Initial surface condition (SSPC Grade A or B),

8.1.4 Whether grinding of edges was employed,

8.1.5 Method of degreasing,

8.1.6 Degree of surface cleanliness,

8.1.7 Surface profile depth (actual); average and range,

8.1.8 Abrasive type and size employed,

8.1.9 Blast nozzle air pressure employed, and

8.1.10 Method of preservation.

9. Keywords

9.1 abrasive; anchor pattern; blast cleaning; coatings; hot-rolled carbon steel; surface cleanliness; surface profile; test panels